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MARINE POWER & EQUIPMENT CO., INC.

1441 NORTH NORTHLAKE WAY • SEATTLE, WA 98103 (206) 632-1441

March 31, 1988

Mr. Richard Koch
Washington State Department of Ecology
4350 - 150th Avenue N.E.
Redmond, WA 98052

Mr. Grover Partee
Environmental Protection Agency
1200 6th Avenue
Seattle, WA 98101

RE: MARINE POWER CONSENT DECREE C85-382R

Gentlemen:

I have enclosed a report by Farr, Friedman & Bruya, Inc., containing an analysis of thirty core sediment samples taken by divers around and underneath our drydocks on Lake Union. We have also attached the map drawn last year by Mike Matta and marked where our divers took the samples. As we expected, there are no significant sandblast sand deposits underneath the drydocks or along the wingwalls. The areas where we plan to concentrate our removal efforts are found primarily along the ends of the open-ended drydocks.

It has been neither practical nor possible at this stage to complete a chemical analysis of the samples, particularly since it is unclear whether you expect inorganic or organic analysis and for what properties. We understand that we are only directed to remove sandblast sand. Since its presence is readily apparent through the testing that we have already accomplished, it appears that further analysis would be premature and needlessly expensive.

We are still working on finding a disposal site once the dredge has been undertaken. As we expected, this is extremely difficult due to the present regulatory climate which forbids both water and land disposal. We were beginning to look into the possibility of adding our small amount to the Navy dredge disposal in Everett when they were sued by various parties to halt those efforts. The U.S. Navy and Corps of Engineers have

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considerable time, money, staff, and political influence to bring to bear. You can imagine how much more difficult it is for us.

Please evaluate the enclosed report and give us your advice as to any further chemical analyses you may require as well as any suggestions you may have for dredge disposal. As you are aware, a removal Plan is due in sixty days. While we will continue to explore alternatives on our own, it is now evident that we will also need the assistance of both your agencies' considerably broader information resources.

Sincerely,

MARINE POWER & EQUIPMENT CO., INC.

Ruth A. Nelson

Ruth A. Nelson
General Counsel

RAN:jef
Enc.

FARR, FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James K. Farr, Ph.D.
Andrew John Friedman
James E. Bruya, Ph.D.

3008 B - 16th West
Seattle, WA 98119
(206) 285-8282

March 29, 1988

Doc Church, Safety Manager
Marine Power & Equipment Co., Inc.
1441 North Northlake Way
Seattle, WA 98103

Dear Doc:

This report is prepared at the request and on behalf of Marine Power and Equipment Co., Inc. in support of sediment studies of Yard 1 Dry Dock facility on Lake Union. Farr, Friedman & Bruya, Inc. has been engaged to supply technical assistance to Marine Power and Equipment Co., Inc. in a small "feasibility study". Marine Power and Equipment Co., Inc. is developing a work plan for sampling bottom sediments at the Yard 1 Dry Dock facility. This preliminary investigation is to be used in designing the work plan.

Enclosed are the following materials:

1. Sediment core logs.

2. Photographs of all sediment cores.

The 3-foot PVC pipe sections containing core samples were received in the laboratory on March 21, 1988. The pipe sections were placed in a freezer and the samples frozen in an upright position.

After freezing, the sediment cores were exposed to view by taking off the tape and metal bands of the pre-cut PVC pipe. The frozen samples were then visually logged and photographed. The core sample was then re-sealed intact and returned to the freezer.

Samples for future chemical analysis will be obtained in the same fashion as above, so that discreet samples may be collected of certain horizons.

Some of the photographs are dark; however, they can be used to distinguish the sandblast material from the lower brown silts. Two samples did not bottom out in the silt and these are identified as samples C-2 and C-4.

As aforementioned, all sediment cores are stored at -20 °C for future reference.

If you should have any questions, please call me at 285-8282. We have appreciated this opportunity to be of service to Marine Power and Equipment Co., Inc.

Sincerely,

James K. Farr, Ph.D.

JKF/jeb
Enclosures

SEDIMENT CLASSIFICATION

The sediment observed in the cores was visually classified in accordance with ASTM D2488-83, which is described in Figure 1. Sediment Cores A-1 through A-3 were extruded from Schedule 80 PVC pipes, classified, placed in glass jars and frozen for possible future analyses. The remainder of the sediment cores were contained in Schedule 80 PVC pipes measuring 3 feet in length, 2 inches in diameter, split lengthwise and sealed with hose clamps and duct tape. The PVC pipes were apparently pushed into the bottom sediment by SCUBA divers. Sediment Samples A-4 through I were examined in the split tubes. The samples were then classified and the split tube resealed and frozen for possible future analysis. Sediment core logs are attached.

A layer of very soft to soft silt with clay ranging from 0.1 to 1.5 feet thick was noted in the top of most cores. This soft silt layer often times included variable amounts of black fine to medium sand, which is believed to be excess sandblasting material. A layer of excess sandblasting material was noted in several cores underlying the very soft silt. The bottom of most of the cores encountered a layer of soft gray to brown silt. This lower silt layer did not have any visual evidence of excess sandblasting material.

LIMITATIONS

We have prepared this report for use by Marine Power and Equipment in their development of a Work Plan for sampling bottom sediments at the Yard 1 dry dock facility. This report may be made available to owners or operators of the property or to regulatory agencies. The report is not intended for use by others and the information contained herein is not applicable to other sites. Our sediment core logs apply only to the locations and depths sampled by Marine Power and Equipment.

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Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in this area at the time the report was prepared. No other conditions, express or implied, should be understood.

Yours very truly,

GeoEngineers, Inc.

Scott E. Widness
Geological Engineer/Hydrogeologist

James A. Miller
Principal

SEW:JAM:cs

Attachments

Three copies submitted

LOG OF SEDIMENT CORE

DEPTH BELOW MUDLINE (FEET)	GROUP SOIL CLASSIFICATION SYMBOL	DESCRIPTION
		SEDIMENT CORE A-1
0 - 1.1	ML	GREENISH-BROWN SILT WITH CLAY AND INCLUSIONS OF BLACK MEDIUM SAND (SANDBLASTING MATERIAL) (VERY SOFT, WET)
1.1 - 2.0	SP	BLACK MEDIUM SAND WITH SILT (SANDBLASTING MATERIAL) (LOOSE, WET)
2.0 - 2.3	ML	GREENISH-GRAY SILT WITH CLAY AND A TRACE OF BLACK MEDIUM SAND (SANDBLASTING MATERIAL) (SOFT, WET)
		PIECE OF BRICK AT 2.1 FEET
2.3 - 2.4	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 2.4 FEET
		SEDIMENT SAMPLE SPLIT FROM 0 TO 1.1 FEET AND FROM 1.1 TO 2.4 FEET
		SEDIMENT CORE A-2
0 - 0.4	ML	GREENISH-GRAY TO BLACK SILT WITH CLAY AND WITH BLACK MEDIUM SAND (SANDBLASTING MATERIAL) (VERY SOFT, WET)
0.4 - 0.6	ML	GREENISH-GRAY TO BLACK SILT WITH CLAY AND WITH BLACK MEDIUM SAND (SANDBLASTING MATERIAL) (SOFT, WET)
0.6 - 1.0	ML	LIGHT GRAY SILT (SOFT, WET)
1.0 - 1.2	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.2 FEET
		SEDIMENT SAMPLE SPLIT FROM 0 TO 0.6 FEET AND FROM 0.6 TO 1.2 FEET
		SEDIMENT CORE A-3
0 - 0.5	ML	BLACK SILT WITH BLACK MEDIUM SAND (SANDBLASTING MATERIAL) (VERY SOFT, WET)
0.5 - 0.7	ML	LIGHT GRAY SILT WITH A TRACE OF ORGANIC MATTER (SOFT, WET)
0.7 - 0.9	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 0.9 FEET
		SEDIMENT SAMPLE SPLIT FROM 0 TO 0.5 FEET AND FROM 0.5 TO 0.9 FEET
		SEDIMENT CORE A-4
0 - 0.3	ML	GREENISH-GRAY SILT WITH CLAY AND WITH BLACK FINE TO MEDIUM SAND (SANDBLASTING MATERIAL) (VERY SOFT, WET)
0.3 - 2.0	SP	BLACK FINE TO MEDIUM SAND WITH SILT (SANDBLASTING MATERIAL) (LOOSE, WET)
2.0 - 2.5	ML	GRAY SILT (SOFT, WET)
2.5 - 2.7	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 2.7 FEET

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LOG OF SEDIMENT CORE

FIGURE 2

LOG OF SEDIMENT CORE

DEPTH BELOW MUDLINE (FEET)	GROUP SOIL CLASSIFICATION SYMBOL	DESCRIPTION
		SEDIMENT CORE A-5
0 - 0.2	ML	GREENISH-BROWN SILT WITH CLAY AND WITH BLACK FINE TO MEDIUM SAND (SANDBLASTING MATERIAL) (VERY SOFT, WET)
0.2 - 2.2	SP	BLACK FINE TO MEDIUM SAND WITH A TRACE OF SILT (SANDBLASTING MATERIAL) (LOOSE, WET)
2.2 - 2.5	ML	LIGHT GRAY SILT (SOFT, WET)
2.5 - 2.7	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 2.7 FEET
		SEDIMENT CORE A-6
0 - 0.1	ML	BLACK SILT WITH CLAY AND A TRACE OF BLACK FINE TO MEDIUM SAND (VERY SOFT, WET)
0.1 - 0.3	SP	BLACK FINE TO MEDIUM SAND WITH SILT AND A TRACE OF ORGANIC MATTER (SANDBLASTING MATERIAL) (LOOSE, WET)
0.3 - 0.5	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 0.5 FEET
		SEDIMENT CORE A-7
0 - 1.3	ML	GREENISH-BROWN SILT WITH CLAY (VERY SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.3 FEET
		SEDIMENT CORE B-1
0 - 0.5	ML	BLACK SILT WITH CLAY AND A TRACE OF ORGANIC MATTER (VERY SOFT, WET) STRONG HYDROCARBON ODOR
0.5 - 0.8	ML	GRAY SILT (SOFT, WET)
0.8 - 1.3	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.3 FEET
		SEDIMENT CORE B-2
0 - 0.1	ML	GREENISH-BROWN SILT WITH CLAY AND WITH BROWN FINE TO MEDIUM SAND (VERY SOFT, WET)
0.1 - 0.4	SM	BROWN SILTY FINE TO MEDIUM SAND (LOOSE, WET)
0.4 - 0.8	ML	BLACK SILT WITH A TRACE OF BROWN FINE TO MEDIUM SAND WITH A TRACE OF ORGANIC MATTER (LOOSE, WET)
		PIECE OF BRICK AT 0.7 FEET
		SEDIMENT CORE COMPLETED AT 0.8 FEET
		SEDIMENT CORE C-1
0 - 0.7	ML	BLACK SILT WITH CLAY AND WITH BLACK FINE TO MEDIUM SAND (VERY SOFT, WET)
0.7 - 1.3	ML	GREENISH-GRAY SILT WITH A TRACE OF BLACK FINE TO MEDIUM SAND (VERY SOFT, WET)
1.3 - 1.6	ML	GRAY SILT (SOFT, WET)
1.6 - 1.8	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.8 FEET

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LOG OF SEDIMENT CORE

FIGURE 3

LOG OF SEDIMENT CORE

DEPTH BELOW MUDLINE (FEET)	GROUP SOIL CLASSIFICATION SYMBOL	DESCRIPTION
		SEDIMENT CORE C-2
0 - 0.2	ML	GREENISH-BROWN SILT WITH CLAY AND WITH A TRACE OF ORGANIC MATTER (VERY SOFT, WET)
0.2 - 1.5	SP	BLACK FINE TO MEDIUM SAND (SANDBLASTING MATERIAL) (LOOSE, WET)
		SEDIMENT CORE COMPLETED AT 1.5 FEET
		SEDIMENT CORE C-3
0 - 0.1	ML	BLACK SILT WITH CLAY (VERY SOFT, WET)
0.1 - 0.6	SP	BLACK FINE TO MEDIUM SAND (SANDBLASTING MATERIAL) (LOOSE, WET)
0.6 - 1.1	ML/SP	BLACK SILT INTERBEDDED WITH BLACK FINE TO MEDIUM SAND (SANDBLASTING MATERIAL) (LOOSE, WET)
		SEDIMENT CORE COMPLETED AT 1.1 FEET
		SEDIMENT CORE C-4
0 - 0.1	ML	GREENISH-BROWN SILT WITH CLAY (VERY SOFT, WET)
0.1 - 1.1	SP	BLACK FINE TO MEDIUM SAND WITH PIECES OF BRICK, METAL AND DEBRIS (SANDBLASTING MATERIAL) (LOOSE, WET)
		SEDIMENT CORE COMPLETED AT 1.1 FEET
		SEDIMENT CORE C-5
0 - 0.1	ML	GREENISH-BROWN SILT WITH CLAY (VERY SOFT, WET)
0.1 - 0.2	ML	BLACK SILT WITH A TRACE OF BLACK FINE TO MEDIUM SAND (SOFT, WET)
0.2 - 0.9	ML	GRAY SILT (SOFT, WET)
0.9 - 1.2	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.2 FEET
		SEDIMENT CORE C-6
0 - 1.1	ML	BLACK SILT WITH CLAY AND A TRACE OF ORGANIC MATTER AND A TRACE OF BLACK FINE TO MEDIUM SAND (VERY SOFT, WET)
1.1 - 1.5	ML	LIGHT GRAY SILT (SOFT, WET)
1.5 - 1.9	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.9 FEET
		SEDIMENT CORE C-7
0 - 0.3	ML	GREENISH-BROWN SILT WITH CLAY (VERY SOFT, WET)
0.3 - 1.2	ML	BLACK SILT WITH A TRACE OF ORGANIC MATTER (SOFT, WET)
1.2 - 1.8	ML	LIGHT GRAY SILT (SOFT, WET)
1.8 - 2.1	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 2.1 FEET

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LOG OF SEDIMENT CORE

FIGURE 4

LOG OF SEDIMENT CORE

DEPTH BELOW MUDLINE (FEET)	GROUP SOIL CLASSIFICATION SYMBOL	DESCRIPTION
		SEDIMENT CORE C-8
0 - 1.5	ML	BLACK SILT WITH CLAY AND A TRACE OF FINE TO MEDIUM BLACK SAND AND ORGANIC MATTER (SANDBLASTING MATERIAL) (VERY SOFT, WET)
1.5 - 2.1	ML	LIGHT GRAY SILT (SOFT, WET)
2.1 - 2.3	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 2.3 FEET
		SEDIMENT CORE C-9
0 - 0.8	ML	BLACK SILT WITH CLAY AND A TRACE OF ORGANIC MATTER (VERY SOFT, WET)
0.8 - 1.1	ML	GRAY SILT (SOFT, WET)
1.1 - 1.2	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.2 FEET
		SEDIMENT CORE C-10
0 - 0.9	ML	DARK GRAY SILT WITH CLAY AND A TRACE OF ORGANIC MATTER (VERY SOFT, WET)
0.9 - 1.4	ML	GREENISH-BROWN SILT (SOFT, WET)
1.4 - 1.7	ML	LIGHT GRAY SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.7 FEET
		SEDIMENT CORE C-11
0 - 0.3	ML	BLACK SILT WITH CLAY AND A TRACE OF ORGANIC MATTER (VERY SOFT, WET)
0.3 - 1.2	ML	LIGHT GRAY SILT (SOFT, WET)
1.2 - 1.4	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.4 FEET
		SEDIMENT CORE C-12
0 - 0.5	ML	BLACK SILT WITH CLAY AND A TRACE OF ORGANIC MATTER (VERY SOFT, WET)
0.5 - 1.0	ML	LIGHT GRAY SILT (SOFT, WET)
1.0 - 1.2	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.2 FEET
		SEDIMENT CORE C-13
0 - 0.1	ML	GREENISH-BROWN SILT WITH CLAY (VERY SOFT, WET)
0.1 - 0.5	SM	BLACK SILTY FINE TO MEDIUM SAND (SANDBLASTING MATERIAL) (LOOSE, WET)
0.5 - 1.0	ML	GRAY SILT (SOFT, WET)
1.0 - 1.2	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.2 FEET

1229-01-4 SEW: TDW 3/28/88

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LOG OF SEDIMENT CORE

FIGURE 5

LOG OF SEDIMENT CORE

DEPTH BELOW MUDLINE (FEET)	GROUP SOIL CLASSIFICATION SYMBOL	DESCRIPTION
		SEDIMENT CORE C-14
0 - 0.2	ML	BLACK SILT WITH CLAY (VERY SOFT, WET)
0.2 - 0.6	SP	BLACK FINE TO MEDIUM SAND (LOOSE, WET)
0.6 - 0.7	ML	BROWN SILT (SOFT, WET)
0.7 - 1.2	ML	LIGHT GRAY SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.2 FEET
		SEDIMENT CORE C-15
0 - 0.1	ML	GREENISH-GRAY SILT WITH CLAY (VERY SOFT, WET)
0.1 - 0.2	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 0.2 FEET
		SEDIMENT CORE C-16
0 - 0.8	SP	BLACK FINE TO MEDIUM SAND (SANDBLASTING MATERIAL) (LOOSE, WET)
0.8 - 1.2	ML	GRAY SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.2 FEET
		SEDIMENT CORE D
0 - 0.2	ML	GREENISH-BROWN SILT WITH CLAY (SOFT, WET)
0.2 - 0.4	ML	GRAY SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 0.4 FEET
		SEDIMENT CORE D-1
0 - 0.7	ML	BLACK SILT WITH CLAY AND A TRACE OF ORGANIC MATTER (VERY SOFT, WET)
0.7 - 1.2	ML	GRAY SILT (SOFT, WET)
1.2 - 1.4	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.4 FEET
		SEDIMENT CORE D-2
0 - 0.6	ML	BLACK SILT WITH CLAY (VERY SOFT, WET)
0.6 - 1.1	ML	LIGHT GRAY SILT (SOFT, WET)
1.1 - 1.2	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 1.2 FEET
		SEDIMENT CORE D-3
0 - 0.6	ML	LIGHT GRAY SILT (SOFT, WET)
0.6 - 0.8	ML	BROWN SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 0.8 FEET
		SEDIMENT CORE I
0 - 0.5	ML	BLACK SILT WITH CLAY (VERY SOFT, WET) STRONG HYDROCARBON ODOR - SHEEN ON SAMPLE
0.5 - 0.9	ML	LIGHT GRAY SILT (SOFT, WET)
		SEDIMENT CORE COMPLETED AT 0.9 FEET

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LOG OF SEDIMENT CORE

FIGURE 6

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND MORE THAN 50% OF COARSE FRACTION PASSES NO. 4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE GRAINED SOILS MORE THAN 50% PASSES NO. 200 SIEVE	SILT AND CLAY LIQUID LIMIT LESS THAN 50	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY LIQUID LIMIT 50 OR MORE	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

1. Field classification is based on visual examination of soil in general accordance with ASTM D2488-83.
2. Soil classification using laboratory tests is based on ASTM D2487-83.
3. Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance of soils, and/or test data.

SOIL MOISTURE MODIFIERS:

Dry – Absence of moisture, dusty, dry to the touch

Moist – Damp, but no visible water

Wet – Visible free water or saturated, usually soil is obtained from below water table

GEI 05-85

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SOIL CLASSIFICATION SYSTEM

FIGURE 1

GEI 05-85

SHEET 1

FARR, FRIEDMAN & BRUYA, INC.
3008 B 16th Avenue West
Seattle, WA 98119
(206) 285-8282

CHAIN OF CUSTODY RECORD

PROJECT LOC: M.P.E. INC 1441 No. NORTHLAKE
PROJECT NAME:
FILE NO.

(HMIDT)

DATE: 03/21/88

m, M.P.E. by Doc Church

H OF LE	TYPE OF SAMPLE	FIELD FILTERED	PRESERVATIVE ADDED TO SAMPLE	ANALYSES TO BE CONDUCTED	NO. OF SAMPLE CONTAINERS	COMMENTS
om	LAKE BOTTOM CORE	NA	NONE	AS BEFORE	ONE TUBE	2" PVC PIPE - CAPPED X 3'
	CORE	"	NONE	AS BEFORE	"	2" PVC PIPE - CAPPED X 3'
	CORE	"	"	"	"	" " X 3'
	CORE	"	"	"	"	" "
	SAND BOTTOM	"	"	"	"	" "
	(MUD SAND SILT)	"	"	"	"	" "
	"	"	"	"	"	" "
	MUD SAND	"	"	"	"	" "
	SLGT ALL	"	"	"	"	" "
	"	"	"	"	"	" "
	"	"	"	"	"	" "

Thurch	DATE 03-21-88	RECEIVED BY (SIGNATURE)	DATE 3/21/88
PMENT.	TIME	NAME Jim Farr	TIME
		FIRM FF&B.	
	DATE	RECEIVED BY (SIGNATURE)	DATE
	TIME	NAME	TIME
		FIRM	

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APR 1988
WATER COMPLIANCE SECTION
EPA - REGION 10

mples C-4 & C-15 minimal due to Gravel and Stone Bottom.

. I threw C-16, Samples D, D1, D2, D3 and Sample I. taken
ood SAT - 3/19 & Sunday 3/20/88

FARR, FRIEDMAN & BRUYA, INC.
3008 B 16th Avenue West
Seattle, WA 98119
(206) 285-8282

CHAIN OF CUSTODY RECORD

PROJECT LOC: M.R.E. INC. 1441 No. NORTHLAKE
PROJECT NAME:
FILE NO.

SAMPLED BY: RICHARD SCHMIDT
DATE: 03/21/88

FOR MPE by Doc Church

SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	DEPTH OF SAMPLE	TYPE OF SAMPLE	FIELD FILTERED	PRESERVATIVE ADDED TO SAMPLE	ANALYSES TO BE CONDUCTED	NO. OF SAMPLE CONTAINERS	COMMENTS
C-12	3/20/88	N/A	LAKE BOTTOM	MUD/SAND SILT-CORE	N/A	NONE	AS BEFORE	ONE 2"x3' PVC-TUBE	TO BE TESTED AS BEFORE = PHYSICAL DESCRIPTION - PHOTOGRAPHED - FINDINGS - ADEQUATE
C-13	3/21/88	↑	↓	"	↓	"	"	"	SAMPLES TO BE RETAINED FOR FURTHER ANALYSES IF REQUIRED -
C-14	3/21/88			"		"	"	"	"
C-15	3/21/88	9 AM		"		"	"	"	"
C-16	3/21/88	TO		"		"	"	"	"
"D"	3/21/88	2 PM		"		"	"	"	"
"D-1"	3/21/88			"		"	"	"	"
"D-2"	3/21/88			"		"	"	"	"
"D-3"	3/21/88	↓	↓	"	↓	"	"	"	"

RELINQUISHED BY (SIGNATURE)
NAME MPE by Mark A Church
FIRM M.P.E. inc
DATE 03/21/88
TIME

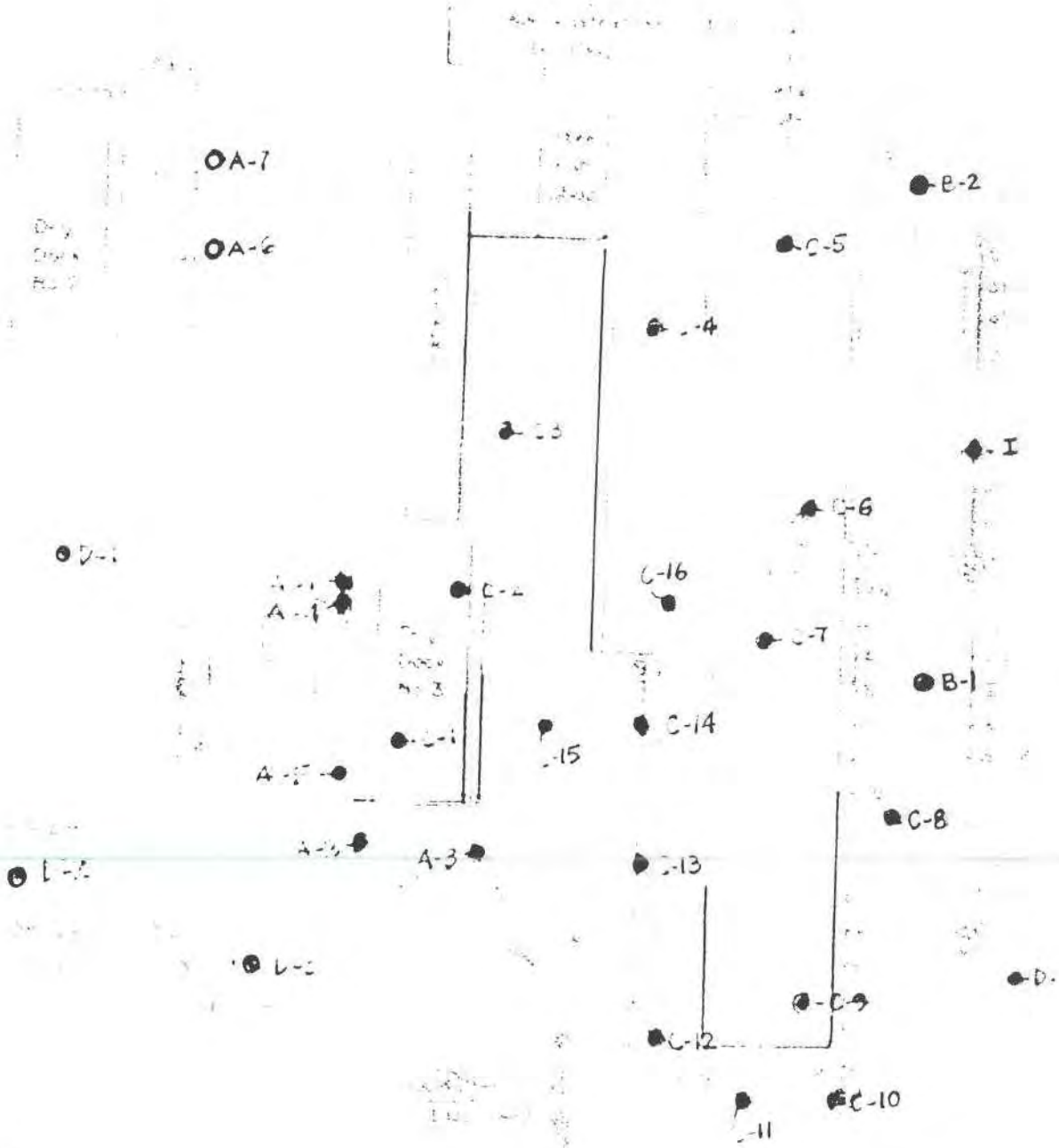
RECEIVED BY (SIGNATURE)
NAME Jim Farr
FIRM F.F.B.
DATE 3/21/88
TIME

RELINQUISHED BY (SIGNATURE)
NAME
FIRM
DATE
TIME

RECEIVED BY (SIGNATURE)
NAME
FIRM
DATE
TIME

ADDITIONAL COMMENTS:

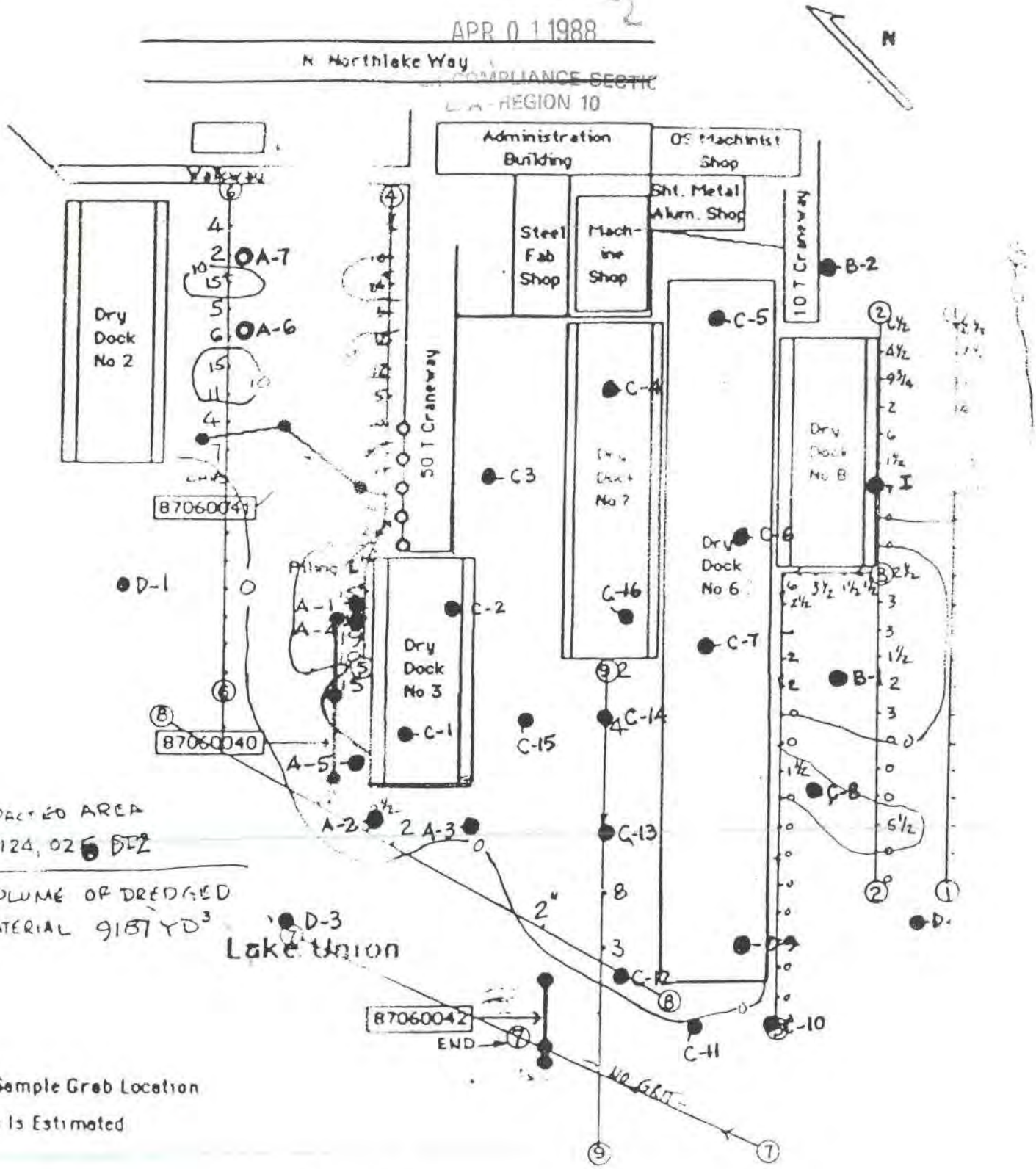
RECEIVED
APR 01 1988
WATER COMPLIANCE SE
EPA - REGION 10



...NY

1441 North Northlake Way, Seattle, Washington

February 5, 1987



IMPACTED AREA
124,026 FT²

VOLUME OF DREDGED MATERIAL 9187 YD³

) - Sample Grab Location

cale is Estimated

FIGURE 1

To: MARINE POWER AND EQUIPMENT CO.
1441 N. NORTHLAKE WAY
SEATTLE, WA. 98107

FROM: RICHARD W. SCHMITT (INSTRUCTOR)
DIVER'S INSTITUTE OF TECHNOLOGY
4601 SHILSHOLE AVE. N.W.
SEATTLE, WA. 98107

SURVEY PROFILE

2/17/88 Requested by M.P.E. to estimate cost, technique and time frame for sub-bottom sample profile of marine yard.

2/18/88 Reviewed time frame coordination and determined present work schedual disallowed my being able to complete profile independently. Proposed coordinating the use of D.I.T. students for training exercise on project at no charge while students employed on project. Accepted by M.P.E.

2/19/88 Arrived at 08:30 with D.I.T boat, dive barge and 16 students. Proceeded laying out search pattern while waiting for sample tubes to be prepaired. Students probed search area and gave discriptions of bottom composition. Tubes arrived at 12:00 and we proceeded with samples # A1, A2, and A3. Departed at 14:00.

2/20/88 Arrived at 08:00. Proceeded with survey. Samples # A4, A5, A6, A7. Departed at 14:00.

2/22/88 Arrived at 08:30. Proceeded with hand sampling, no tubes available. Departed at 14:00.

3/4/88 Arrived at 08:30. Proceeded with samples # B1, B2, B3. Departed at 14:00.

Due to time frame and class scheduling, use of training dives interrupted, requested by M.P.E. to complete survey with submitted charge.

3/19/88 Arrived at 09:00. Two man dive team. Proceeded with samples # C1 thru C10. Departed at 15:00.

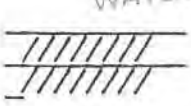
3/20/88 Arrived at 09:30. Two man dive team. Proceed with samples # C11 thru C16. Also samples marked "I" and "D". Survey completed and departed at 12:30.

REVIEW OF SURVEY:

It is noted from each diver's report that the areas of samples A1 thru A7 the bottom sediments appear layered. Suspect areas pointed out by the E.P.A. were probed by each diver with a rod. After forcing a hole down through, as deep as possible, the diver hand felt each layer as best as possible and described his findings.

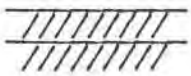
Examples are as follows;

Sample area A6;



1st layer crusted 1/4 to 1/2 in. thick sand.
2nd layer mud 1 foot deep
3rd layer crusted 1 in. thick
below 3rd layer deep mud

Sample area A7



1st layer hard packed sand 8 in. deep
2nd layer 16 in. mud
3rd layer 2 in. sand
below 3rd layer deep mud

As depicted above, below is listed layering as per area;

A1--- 2in. crust, 1 foot mud, 2in. crust, mud below.
A2--- no crust all mud
A3--- no crust all mud
C1--- 2in. crust, mud below
C2--- 6in. crust, mud below
C3--- hard bottom
C4--- hard bottom
C15-- gravel
B1--- 3in. crust, mud below
B2--- 6in. crust, mud below
B3--- 6in. crust, mud below

Notes:

Due to the course grain structure of the sand used in blasting it seems to bond together in supported layers by cushions of mud depending on the density of the silt and or mud.

The areas shallower than 22 feet show high concentrations of what appears to be coal chunks and granuals (sand).

Areas centered under the dry docks seem to be predominatly hard bottom.


A-4


A-5


A-6


A-7


"I"


B-1


B-2

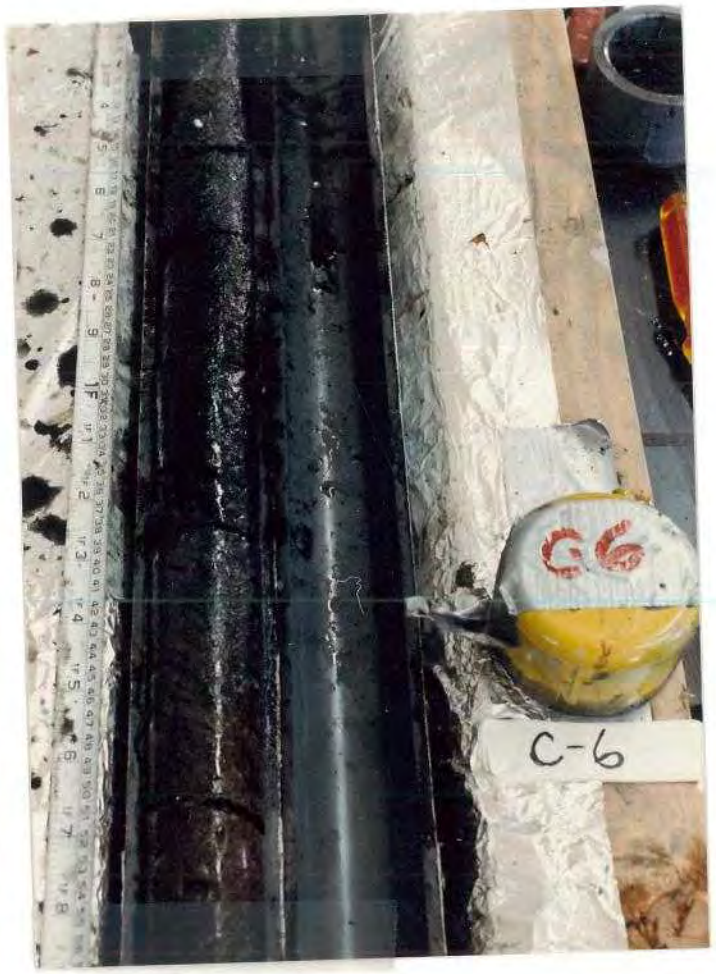

C-1


C-2


C-3


C-4


C-5


C6
C-6


C-7


C8
C-8


C-9


C-10


C-11


C-12


C-13


C-14


C-15


C-16


D
D


D-1
D-1


D-2
D-2


D-3